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A NEW SPECIES OF *KYARRANUS* (ANURA: LEPTODACTYLIDAE) FROM QUEENSLAND, AUSTRALIA

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ABSTRACT

Kyarranus kundagungan sp. nov, a ground-dwelling rainforest frog from the Great Dividing Range of southeast Queensland, is characterised by its robust pear-shaped body, bright red to black dorsal surface, and immaculate yellow surface with a red patch on the throat. Notes are provided on its habitat, call, ova, and larvae.

In the course of studying frogs of southeastern Queensland, the authors discovered an undescribed species near Cunningham's Gap, on the Great Dividing Range. The species is a member of the montane genus, *Kyarranus* Moore. Further searching located it 20 kilometres north at Mistake Mountains, and 19 kilometres south at Teviot Falls.

Abbreviations used in text are: EN = eye to naris distance; IN = internarial span; HW = head width; TL = tibia length; SV = snout to vent length. Institutions in which specimens are deposited are: QM = Queensland Museum, AM = Australian Museum, NMV = National Museum of Victoria, SAM = South Australian Museum, WAM = West Australian Museum, QVM = Queen Victoria Museum.

Kyarranus kundagungan sp. nov.

MATERIAL EXAMINED

HOLOTYPE: Adult female, QM J23944, from Mistake Mountains (Lat. 27°53′S, Long. 152°21′E), about 800 metres above sea level, and 83 kilometres southwest of Brisbane, SE. Queensland, collected by C. J. Corben and A. K. Smyth, 3 January 1974.

PARATYPES: QM J23945, SAM R13921–2, WAM R45071, QVM 1974/4/1, collected 3 January 1974 by C. J. Corben and A. K. Smyth at type locality. QM J22677–81, AM R38193–4 (1 December 1972), NMV D33826 (26 June 1973), collected by G. J. Ingram and C. J. Corben at Lat. 28°04′S, Long. 152°24′E. QM J23946, collected 3 January 1974 by G. J. Ingram at Teviot Falls (Lat. 28°14′S, Long. 152°29′E.).

OTHER MATERIAL: D. S. Liem collection 6817, Cunningham's Gap, Qd.

DEFINITION

A small squat frog (SV 23·8–29·9) of montane rainforests, characterised by its robust, pear-shaped body, bright red to black dorsal surface, immaculate yellow ventral surface with red patch on throat, unwebbed fingers and toes, concealed tympani, first finger shorter than second, and vomerine series behind level of choanae.

DESCRIPTION OF HOLOTYPE

Body robust, pear-shaped; in profile, snout slopes anteriorly to a blunt tip; canthus rostralis distinct and concave; pupil horizontal; tympanum concealed; tongue large, posterior edge free; vomerine teeth in two straight series, posterior to, and extending to medial edges of, choanae.

No webbing on fingers or toes; fingers in decreasing order of length are $3 > 2 > 4 > 1$; inner and outer palmar tubercles small but distinct. Large flange along inside edge of second finger. Hind limbs short; toes cylindrical, with small tubercles at proximal joints; toes in decreasing order of length are $4 > 3 > 5 > 2 > 1$; inner metatarsal tubercle small and at base of first toe; no outer metatarsal tubercle. Skin smooth.

Dimensions: SV 25·0; TL 11·0; HW 8·1; EN 2·0; IN 2·9; TL/SV = 0·44; HW/SV = 0·32; EN/IN = 0·70.

Colouration in life: On body, dorsal surface bright purplish-red (Pompeian red of Ridgway

1912), with two black (Dull violet black of Ridgway) V-shaped markings on back originating medially, and extending posteriorly towards inguinal regions; lips edged yellow, with fine black barring; heavy black band extends from nostrils to eye, and from eye towards arm; black patch on lateral surface between arm and leg; ventral surfaces bright yellow (Strontian yellow of Ridgway), with an extensive diffuse red patch on throat; cloaca, inguinal and axillary regions yellow. On forelimbs, dorsal surface black with yellow round base of arm; ventral surface yellow; palm brown and fingers yellow with black bands on third and fourth. On hindlimb, dorsal surface black; ventral surface yellow; posterior surface of tarsus and sole of foot black. In alcohol all yellow regions have turned white.

Variation

Female paratypes (AM R38194, NMV D33826, QM J23945) do not differ much from holotype in dimensions and proportions: SV 23·8–25·4 (mean 24·5); TL 9·8–10·4 (10·0); HW 8·6–9·2 (8·8); EN 1·8–1·9 (1·9); IN 2·8–3·1 (2·9); TL/SV 0·34–0·43 (0·39); HW/SV 0·36–0·39 (0·38); EN/IN 0·61–0·68 (0·64). Dimensions of male paratypes are similar to those of females: SV 23·8–29·9 (26·2); TL 9·9–11·9 (10·8); HW 7·8–9·9 (9·0); EN 1·6–2·2 (1·9); IN 2·6–3·4 (3·0); TL/SV 0·38–0·44 (0·41); HW/SV 0·31–0·39 (0·34); EN/IN 0·53–0·74 (0·63).

In most specimens the vomerine series do not extend to the medial edges of the choanae. Males in breeding condition show extensive dark brown nuptial pads on the dorsal surfaces of the first fingers. (Fig. 1B). Breeding females show flanges on second fingers, as in holotype (Fig. 1A). Fingers of males in decreasing order of length are $3 > 2 = 4 > 1$. The head stripe is variable in extent and intensity. The dorsal colouration varies from one extreme where the entire dorsal surface is bright red, to the other where the red is replaced by black. J22680–1 and J23945–6 have turned brown from preservation.

In most individuals the red colouration on the throat is confined to a small diffuse patch, but in some the throat is entirely red and sharply delimited from the rest of the under-surface.

Larval Morphology

The following description applies to typical larvae in stages 31 to 33. Eight such larvae had total lengths between 16·6 and 19·0 mm (mean 18·0).

The body is widest across the mid-region of the abdomen, and at this point it is slightly wider than deep. The snout is evenly rounded from both dorsal

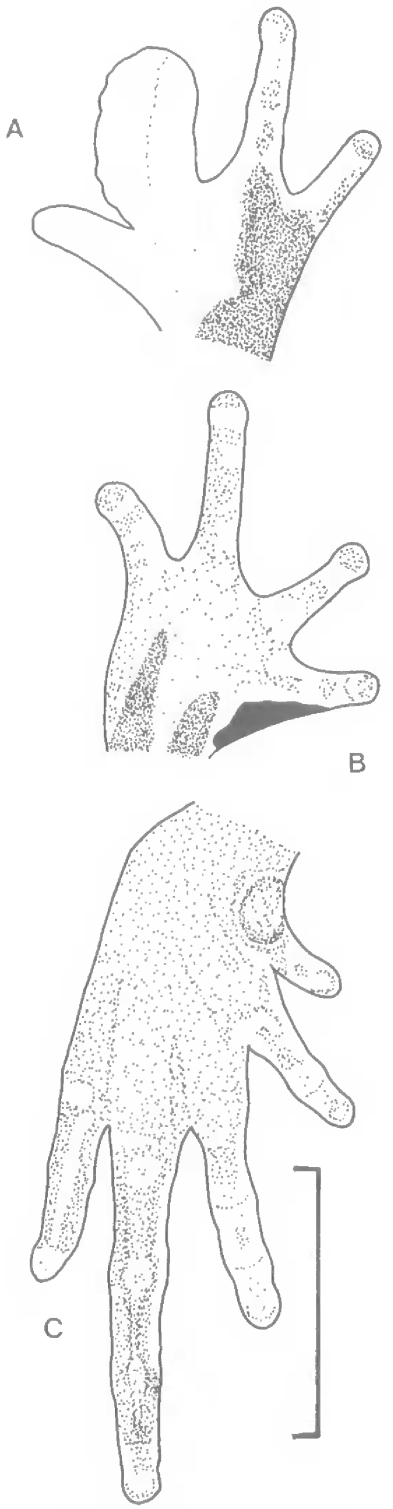

Fig. 1: A. Ventral view of hand of female in breeding condition (AM R38194). B. Ventral view of hand of breeding male. C. Ventral view of foot of female (AM R38194). (Scale line 5 mm).

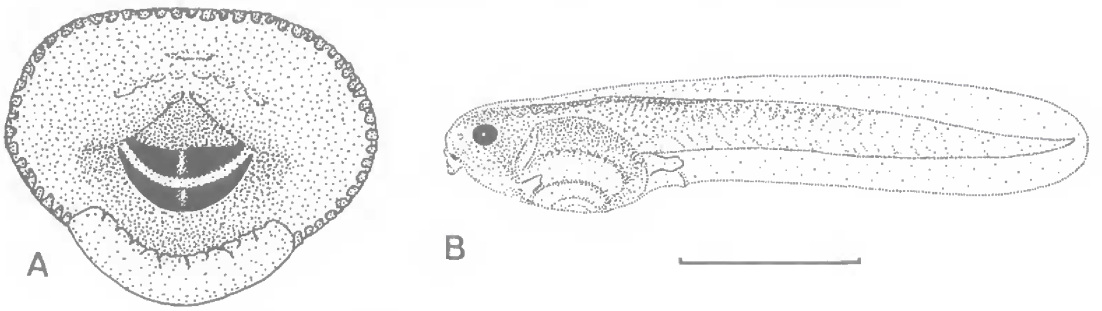

FIG. 2: A, Mouthparts of stage 31 larva. B, Lateral view of stage 31 larva (Scale line 5 mm).

and lateral views. The nares are widely spaced, being positioned dorso-laterally in line with the eyes. They open in an antero-lateral direction. The eyes are dorso-lateral in position and variable (in diameter) from quite small to fairly large. The spiracle is sinistral, lateral in position and visible from above. It opens posteriorly and increases in diameter from the opening to the origin. The anal tube is median and quite prominent, opening well out from the body at the edge of the ventral fin.

The mouth is antero-ventral in position and opens anteriorly. There is a single row of peripheral papillae around all but the upper median two-thirds of the disc where a partially involuted flap of skin forms a pocket (Fig. 2A). There are no labial tooth rows. In some specimens, the lower labium bears broken papillae-like ridges arranged somewhat in rows.

The curved beaks both have fine serrations. The upper beak is a little less massive than the lower.

In preserved specimens, the dorsal surface is lightly pigmented, the density increasing over the brain and spinal cord regions and over parts of the intestinal mass. In lateral view, the pigment partly extends over the gill region and the intestinal mass. The ventral surface is clear. The dorsal surface of the tail musculature is lightly stippled over most of its length, the pigment decreasing posteriorly. Laterally it scatters over the anterior half of the musculature. The dorsal fin is sparsely stippled while the ventral fin is clear or with occasional flecks. The iris appears black.

FIELD NOTES

Kyarranus kundagungan is a ground-dwelling frog of sub-tropical rainforest in mountainous areas. It is known only from very damp situations, particularly saturated leaf-litter and mud in soaks or small creek beds. In such sites, males call from water-filled cavities covered with rocks or leaf-litter. Calling takes place from late August to mid-February.

Egg masses have been found in late November and early December. The foam mass resembles that described by Moore (1961) for *K. loveridgei*. The albumen is very wet and sticky with air bubbles mainly at the top and the large cream-coloured eggs concentrated at the bottom. The eggs are about 3·1 mm in diameter and are contained in individual jelly capsules of approximately 4·9 mm diameter.

Tadpoles have been found in typical water-filled cavities, and groups of newly metamorphosed larvae in drier hollows. Juvenile frogs have been located in January and late August, the latter presumably being progeny from the previous season. Very young individuals are blackish with variable amounts of white speckling on the ventral surfaces.

Vertebrates found synchronosympatric with *K. kundagungan* were: *Lechriodus fletcheri*, *Mixophyes fasciolatus*, *M. balbus*, *Litoria pearsoni*, *Lampropholis challengeri* (Challenger Skink), *Tropidechis carinatus* (Rough-scaled Snake), and *Melomys cervinipes* (Mosaic-tailed Rat) at Cunningham's Gap; *Adelotus brevis*, *Lechriodus fletcheri*, *Mixophyes fasciolatus*, *Litoria pearsoni*, *L. leseurii*, and an undescribed *Litoria* belonging to the *ewingi* group, and *Anomalopus truncatus* at Teviot Falls; *Adelotus brevis* at Mistake Mountains.

COMPARISON WITH OTHER SPECIES*

Kyarranus kundagungan is markedly different from *K. sphagnicolus* and *K. loveridgei* in exhibiting the distinctive red, black and yellow colouration. *Kyarranus sphagnicolus* has a more rounded, wider head and longer tibia (TL/SV 0·45–0·50), the dorsal ground colouring is grey to reddish brown, the

*Based on examination of 29 specimens of *K. loveridgei* in the Queensland Museum collections (from Lamington Plateau, 35 km S. of Boonah, and Mt. Warning) and 2 specimens of *K. sphagnicolus* (from Pt. Lookout).

ventral surface white to brown and the throat darkly mottled. Breeding females have flanges on both first and second fingers. The call of *K. sphagnicolus* is described by Moore (1961) as a soft growl 'gurr-r-r', quite different from that of *K. kundagungan*, which is a deep guttural 'ork'. It is difficult to distinguish between the calls of *K. loveridgei* and *K. kundagungan*.

Kyarranus loveridgei and *K. kundagungan* are similar in shape, size and habitat. *Kyarranus loveridgei* has SV 21·7–30·2 (26·4), TL/SV 0·35–0·46 (0·41), HW/SV 0·31–0·39 (0·35) and EN /IN 0·50–0·83 (0·63). However, *K. kundagungan* is more robust and pear-shaped, and the canthus rostralis is usually less defined than that of *K. loveridgei*. The dorsal colouring of *K. loveridgei* is grey to brown, the ventral surface is whitish to grey with darker speckling, and the throat has brown mottling, while *K. kundagungan* has a dorsal ground colouring of bright red to black, the ventral surface is immaculate yellow, and the throat has a diffuse red patch or is completely red. Male *K. loveridgei* may be found calling from cavities anywhere on the forest floor, especially along creeks, whereas *K. kundagungan* is confined to wet patches in creeks and soaks. The cavities of *K. loveridgei* are smooth-walled, in moist earth, and contain no water. The eggs are placed in these, and the tadpoles when present, are in liquified jelly. (Moore, 1961, reports similar observations). The cavities of *K. kundagungan* are filled with water which can freely seep in and out, and in which the eggs are laid and the tadpoles swim during development.

Moore (1961) suggests that *K. loveridgei* could lack nuptial pads, however breeding males of both it and *K. kundagungan* possess similar nuptial pads on the dorsal surfaces of the first fingers.

Etymology

The name *kundagungan* is derived from the words 'kunda', mountain, and 'gungan', frog, from the dialect of the Kabi tribe, that once lived in south-east Queensland.

Distribution

Currently known from Mistake Mountains (the type locality) in the north, south along the Great Dividing Range to Teviot Falls.

DISCUSSION

Spencer (1901) named *Philoria frosti* from Mt. Baw Baw, Victoria. Parker (1940) described *Philoria loveridgei* from the McPherson Range, SE. Queensland. Moore (1958) concluded that *loveridgei* was generically distinct from *P. frosti* and referred the former and a new species (*sphagnicolus*, from Pt. Lookout, near Ebor, New South Wales) to a new genus, *Kyarranus*.

The status of *Kyarranus* has been the subject of controversy. The similarity between *Kyarranus* and *Philoria* in adult and larval morphology, and ecology has been commented on by several authors. Brattstrom (1970) indicated his intention to synonymise these two genera, (a move which Watson and Martin, 1973, supported by evidence from life histories). However, Lynch (1971) considered the two genera to be superficially similar, reflecting parallel adaptation to a montane environment, and suggested that they represent the result of independent divergence from a *Limnodynastes*-like ancestor. Tyler (1972) recognised both genera when describing the superficial mandibular musculature and vocal sacs, and reviewing the phylogeny of Australo-Papuan leptodactylids. As currently recognised, *Kyarranus* consists of two species groups, one containing *K. sphagnicolus*, the other including *K. loveridgei* and *K. kundagungan*. These groups resemble each other considerably more than either resembles *Philoria*. The authors consider that with the data presently available it is best to recognise *Kyarranus* as a distinct genus.

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PLATE 42

Kyarranus kundagungan, live specimen, Cunningham's Gap.